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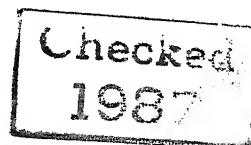
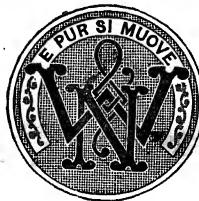
## MAN'S PLACE IN NATURE.



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THOMAS HENRY HUXLEY,

FELLOW OF THE ROYAL SOCIETY.



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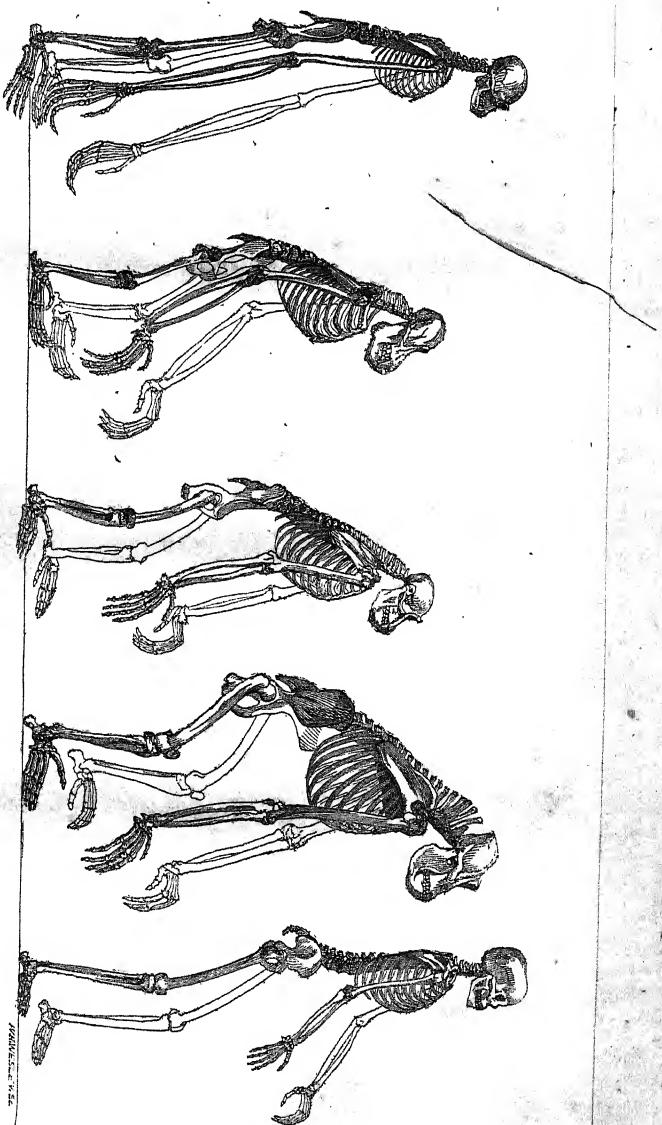
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*Skeletons of the*

**GIBBON.**

**ORANG.**

**CHIMPANZEE.**

**GORILLA.**

**MAN.**

*Photographically reduced from Diagrams of the natural size (except that of the Gibbon, which was twice as large as nature), drawn by Mr. Waterhouse Hawkins from specimens in the Museum of the Royal College of Surgeons.*

## ADVERTISEMENT TO THE READER.

---

THE greater part of the substance of the following Essays has already been published in the form of Oral Discourses, addressed to widely different audiences, during the past three years.

Upon the subject of the second Essay, I delivered six Lectures to the Working Men in 1860, and two, to the members of the Philosophical Institution of Edinburgh in 1862. The readiness with which my audience followed my arguments, on these occasions, encourages me to hope that I have not committed the error, into which working men of science so readily fall, of obscuring my meaning by unnecessary technicalities: while, the length of the period during which the subject, under its various aspects, has been present to my mind, may suffice to satisfy the reader that, my conclusions, be they right or be they wrong, have not been formed hastily or enunciated crudely.

T. H. H.

LONDON: *January, 1863.*

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# I.—ON THE NATURAL HISTORY OF THE MAN-LIKE APES.

ANCIENT traditions, when tested by the severe processes of modern investigation, commonly enough fade away into mere dreams: but it is singular how often the dream turns out to have been a half-waking one, presaging a reality. Ovid foreshadowed the discoveries of the geologist: the Atlantis was an imagination, but Columbus found a western world: and though the quaint forms of Centaurs and Satyrs have an existence only in the realms of art, creatures approaching man more nearly than they in essential structure, and yet as thoroughly brutal as the goat's or horse's half of the mythical compound, are now not only known, but notorious.

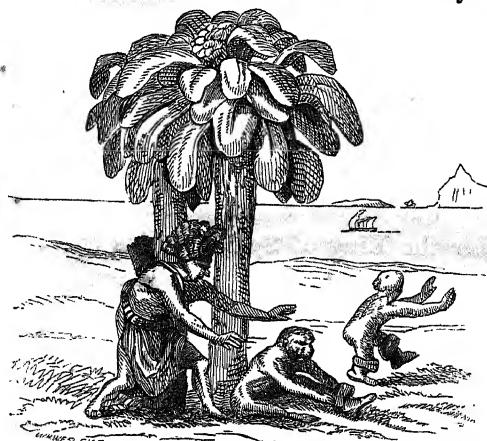


FIG. 1.—*Simiae magnatum deliciae*.—De Bry, 1598.

is entitled “De Animalibus quæ in hac provincia reperium-

\* *REGNUM CONGO: hoc est VERA DESCRIPTIO REGNI AFRICANI QUOD TAM AB INCOLIS QUAM LUSITANIS CONGUS APPELLATUR*, per Philippum Piga-

tur," and contains a brief passage to the effect that "in the Songan country, on the banks of the Zaire, there are multitudes of apes, which afford great delight to the nobles by imitating human gestures." As this might apply to almost any kind of apes, I should have thought little of it, had not the brothers De Bry, whose engravings illustrate the work, thought fit, in their eleventh "Argumentum," to figure two of these "Simiæ magnatum deliciæ." So much of the plate as contains these apes is faithfully copied in the woodcut (fig. 1), and it will be observed that they are tail-less, long-armed, and large-eared; and about the size of Chimpanzees. It may be that these apes are as much figments of the imagination of the ingenious brothers as the winged, two-legged, crocodile-headed dragon which adorns the same plate; or, on the other hand, it may be that the artists have constructed their drawings from some essentially faithful description of a Gorilla or a Chimpanzee. And, in either case, though these figures are worth a passing notice, the oldest trustworthy and definite accounts of any animal of this kind date from the 17th century, and are due to an Englishman.

The first edition of that most amusing old book, "Purchas his Pilgrimage," was published in 1613, and therein are to be found many references to the statements of one whom Purchas terms "Andrew Battell (my neere neighbour, dwelling at Leigh in Essex) who served under Manuel Silvera Perera, Governor under the King of Spaine, at his city of Saint Paul, and with him went farre into the countrey of Angola;" and again, "my friend, Andrew Battle, who lived in the kingdom of Congo many yeares," and who, "upon some quarell betwixt the Portugals (among whom he was a sergeant of a band) and him, lived eight or nine moneths in the woodes." From this weather-beaten old soldier, Purchas

fettam, olim ex Edoardo Lopez acroamatis lingua Italica excerpta, num Latio sermone donata ab August. Cassiod. Reinio. Iconibus et imaginibus rerum memorabilium quasi vivis, opera et industria Joan. Theodori et Joan. Israelis de Bry, fratum exornata. Francofurti, MDXCVIII.

was amazed to hear "of a kinde of Great Apes, if they might so bee termed, of the height of a man, but twice as bigge in feature of their limmes, with strength proportionable, hairie all over, otherwise altogether like men and women in their whole bodilyshape.\* They lived on such wilde fruits as the trees and woods yielded, and in the night time lodged on the trees."

This extract is, however, less detailed and clear in its statements than a passage in the third chapter of the second part of another work—"Purchas his Pilgrimes," published in 1625, by the same authör—which has been often, though hardly ever quite rightly, cited. The chapter is entitled, "The strange adventures of Andrew Battell, of Leigh in Essex, sent by the Portugals prisoner to Angola, who lived there and in the adioining regions neere eighteene yeeres." And the sixth section of this chapter is headed—"Of the Provinces of Bongo, Calongo, Mayombe, Manikesocke, Motimbas: of the Ape Monster Pongo, their hunting: Idolatries; and divers other observations."

"This province (Calongo) toward the east bordereth upon Bongo, and toward the north upon Mayombe, which is nineteen leagues from Longo along the coast.

"This province of Mayombe is all woods and groves, so overgrowne that a man may travaile twentie days in the shadow without any sunne or heat. Here is no kind of corne nor graine, so that the people liveth onely upon plantanes and roots of sundrie sorts, very good; and nuts; nor any kinde of tame cattell, nor hens.

"But they have great store of elephant's flesh, which they greatly esteeme, and many kinds of wild beasts; and great store of fish. Here is a great sandy bay, two leagues to the northward of Cape Negro,† which is the port of Mayombe. Sometimes the Portugals lade logwood in this bay. Here is

\* "Except this that their legges had no calves."—[Ed. 1626.] And in a marginal note, "These great apes are called Pongo's."

† *Purchas' note.*—Cape Negro is in 16 degrees south of the line.

a great river, called Banna: in the winter it hath no barre, because the generall winds cause a great sea. But when the sunne hath his south declination, then a boat may goe in; for then it is smooth because of the raine. This river is very great, and hath many ilands and people dwelling in them. The woods are so covered with baboones, monkies, apes and parrots, that it will feare any man to travaile in them alone. Here are also two kinds of monsters, which are common in these woods, and very dangerous.

“The greatest of these two monsters is called Pongo in their language, and the lesser is called Engeco. This Pongo is in all proportion like a man; but that he is more like a giant in stature than a man; for he is very tall, and hath a man’s face, hollow-eyed, with long haire upon his browes. His face and eares are without haire, and his hands also. His bodie is full of haire, but not very thicke; and it is of a dunnish colour.

“He differeth not from a man but in his legs; for they have no calfe. Hee goeth alwaies upon his legs, and carrieth his hands clasped in the nape of his necke when he goeth upon the ground. They sleepe in the trees, and build shelters for the raine. They feed upon fruit that they find in the woods, and upon nuts, for they eate no kind of flesh. They cannot speake, and have no understanding more than a beast. The people of the countrie, when they travaile in the woods make fires where they sleepe in the night; and in the morning when they are gone, the Pongoes will come and sit about the fire till it goeth out; for they have no understanding to lay the wood together. They goe many together and kill many negroes that travaile in the woods. Many times they fall upon the elephants which come to feed where they be, and so beate them with their clubbed fists, and pieces of wood, that they will runne roaring away from them. Those Pongoes are never taken alive because they are so strong, that ten men cannot hold one of them; but yet they take many of their young ones with poisoned arrowes.

The young Pongo hangeth on his mother's belly with his  
s fast clasped about her, so that when the countrie  
le kill any of the females they take the young one,  
h hangeth fast upon his mother.

When they die among themselves, they cover the dead  
great heaps of boughs and wood, which is commonly  
d in the forest." \*

does not appear difficult to identify the exact region of  
h Battell speaks. Longo is doubtless the name of the  
e usually spelled Loango on our maps. Mayombe still  
some nineteen leagues northward from Loango, along the  
t; and Cilongo or Kilonga, Manikesocke, and Motimbas  
yet registered by geographers. The Cape Negro of Bat-  
however, cannot be the modern Cape Negro in 16° S.,  
e Loango itself is in 4° S. latitude. On the other hand,  
"great river called Banna" corresponds very well with  
"Camma" and "Fernand Vas," of modern geographers,  
eh form a great delta on this part of the African coast.  
ow this "Camma" country is situated about a degree and  
lf south of the Equator, while a few miles to the north  
he line lies the Gaboon, and a degree or so north of  
, the Money River—both well known to modern natu-  
sts as localities where the largest of man-like Apes has  
a obtained. Moreover, at the present day, the word  
zeco, or N'schego, is applied by the natives of these  
ions to the smaller of the two great Apes which inhabit  
m; so that there can be no rational doubt that Andrew  
tell spoke of that which he knew of his own knowledge,  
at any rate, by immediate report from the natives of

Purchas' marginal note, p. 982 :—"The Pongo a giant ape. He told me in  
erence with him, that one of these Pongoes tooke a negro boy of his which  
l a moneth with them. For they hurt not those which they surprise at  
wares, except they look on them; which he avoyded. He said their highth  
like a man's, but their bignesse twice as great. I saw the negro boy. What  
other monster should be he hath forgotten to relate; and these papers came  
ny hand since his death, which, otherwise, in my often conferences, I might  
e learned. Perhaps he meaneth the Pigmy Pongo killers mentioned."

Western Africa. The "Engeco," however, is that "other monster" whose nature Battell "forgot to relate," while the name "Pongo"—applied to the animal whose characters and habits are so fully and carefully described—seems to have died out, at least in its primitive form and signification. Indeed, there is evidence that not only in Battell's time, but up to a very recent date, it was used in a totally different sense from that in which he employs it.

For example, the second chapter of Purchas' work, which I have just quoted, contains "A Description and Historicall Declaration of the Golden Kingdom of Guinea, &c. &c. Translated from the Dutch, and compared also with the Latin," wherein it is stated (p. 986) that—

"The River Gaboon lyeth about fifteen miles northward from Rio de Angra, and eight miles northward from Cape de Lope Gonsalvez (Cape Lopez), and is right under the Equinoctial line, about fifteene miles from St. Thomas, and is a great land, well and easily to be knowne. At the mouth of the river there lieth a sand, three or foure fathoms deepe, whereon it beateth mightily with the stremme which runneth out of the river into the sea. This river, in the mouth thereof, is at least four miles broad; but when you are about the Iland called *Pongo*, it is not above two miles broad.

On both sides the river there standeth many trees. . . . . The Iland called *Pongo*, which hath a monstrous high hill."

The French naval officers, whose letters are appended to the late M. Isidore Geoff. Saint Hilaire's excellent essay on the Gorilla,\* note in similar terms the width of the Gaboon, the trees that line its banks down to the water's edge, and the strong current that sets out of it. They describe two islands in its estuary;—one low, called Perroquet; the other high, presenting three conical hills, called Coniquet; and one of them, M. Franquet, expressly states that, formerly, the Chief of Coniquet was called *Meni-Pongo*, meaning thereby Lord

\* Archives du Museum, Tome X.

of *Pongo*; and that the *N'Pongues* (as, in agreement with Dr. Savage, he affirms the natives call themselves) term the estuary of the Gaboon itself *N'Pongo*.

It is so easy, in dealing with savages, to misunderstand their applications of words to things, that one is at first inclined to suspect Battell of having confounded the name of this region, where his "greater monster" still abounds, with the name of the animal itself. But he is so right about other matters (including the name of the "lesser monster") that one is loth to suspect the old traveller of error; and, on the other hand, we shall find that a voyager of a hundred years' later date speaks of the name "Boggoe," as applied to a great Ape, by the inhabitants of quite another part of Africa—Sierra Leone.

But I must leave this question to be settled by philologists and travellers; and I should hardly have dwelt so long upon it except for the curious part played by this word '*Pongo*' in the later history of the man-like Apes.

The generation which succeeded Battell saw the first of the man-like Apes which was ever brought to Europe, or, at any rate, whose visit found a historian. In the third book of Tulpia's "Observationes Medicæ," published in 1641, the 56th chapter or section is devoted to what he calls *Satyrus indicus*, "called by the Indians Orang-autang, or Man-of-the Woods, and by the Africans Quoias Morrou." He gives a very good figure, evidently from the life, of the specimen of this animal,



FIG. 2.—The Orang of Tulpia, 1641.  
"nostra memoria ex Angolâ delatum," presented to Frederick

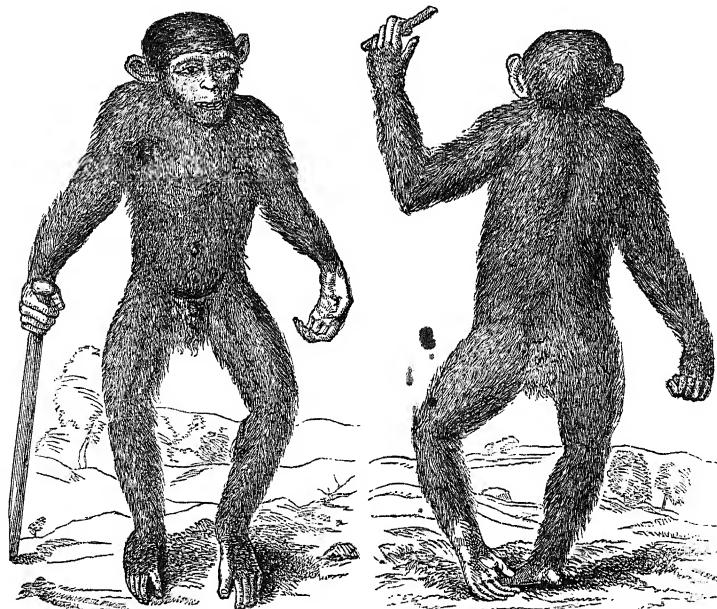
Henry Prince of Orange. Tulpus says it was as big as a child of three years old, and as stout as one of six years: and that its back was covered with black hair. It is plainly a young Chimpanzee.

In the meanwhile, the existence of other, Asiatic, man-like Apes became known, but at first in a very mythical fashion. Thus Bontius (1658) gives an altogether fabulous and ridiculous account and figure of an animal which he calls "Orang-outang"; and though he says, "vidi Ego cujus effigiem hic exhibeo," the said effigies (see fig. 6 for Hoppius' copy of it) is nothing but a very hairy woman of rather comely aspect, and with proportions and feet wholly human. The judicious English anatomist, Tyson, was justified in saying of this description by Bontius, "I confess I do mistrust the whole representation."

It is to the last mentioned writer, and his coadjutor Cowper, that we owe the first account of a man-like ape which has any pretensions to scientific accuracy and completeness. The treatise entitled, "Orang-outang, sive Homo Sylvestris; or the Anatomy of a Pygmie compared with that of a *Monkey*, an *Ape*, and a *Man*," published by the Royal Society in 1699, is, indeed, a work of remarkable merit, and has, in some respects, served as a model to subsequent inquirers. This "Pygmie," Tyson tells us, "was brought from Angola, in Africa; but was first taken a great deal higher up the country;" its hair "was of a coal-black colour, and strait;" and "when it went as a quadruped on all four, 'twas awkwardly; not placing the palm of the hand flat to the ground, but it walk'd upon its knuckles, as I observed it to do when weak and had not strength enough to support its body."—"From the top of the head to the heel of the foot, in a strait line, it measured twenty-six inches."

These characters, even without Tyson's good figures (figs. 3 and 4), would have been sufficient to prove his "Pygmie" to be a young Chimpanzee. But the opportunity of examining the skeleton of the very animal Tyson anatomised

having most unexpectedly presented itself to me, I am able to bear independent testimony to its being a veritable *Troglodytes niger*,



FIGS. 3 & 4.—The 'Pygmie' reduced from Tyson's figures 1 and 2, 1699.

*Troglodytes niger*,\* though still very young. Although fully appreciating the resemblances between his Pygmie and Man, Tyson by no means overlooked the differences between the two, and he concludes his memoir by summing up first, the points in which "the Ourang-outang or Pygmie more resembled a Man than Apes and Monkeys do," under forty-seven distinct heads; and then giving, in thirty-four similar brief paragraphs, the respects in which "the Ourang-outang or

\* I am indebted to Dr. Wright, of Cheltenham, whose paleontological labours are so well known, for bringing this interesting relic to my knowledge. Tyson's granddaughter, it appears, married Dr. Allardyce, a physician of repute in Cheltenham, and brought, as part of her dowry, the skeleton of the 'Pygmie.' Cheltenham, and brought, as part of her dowry, the skeleton of the 'Pygmie.' Dr. Allardyce presented it to the Cheltenham Museum, and, through the good offices of my friend Dr. Wright, the authorities of the Museum have permitted me to borrow, what is, perhaps, its most remarkable ornament.

Pygmie differ'd from a Man and resembled more the Ape and Monkey kind."

After a careful survey of the literature of the subject extant in his time, our author arrives at the conclusion that his "Pygmie" is identical neither with the Orangs of Tulpius and Bontius, nor with the Quoias Morrou of Dapper (or rather of Tulpius), the Barris of d'Arcos, nor with the Pongo of Battell; but that it is a species of ape probably identical with the Pygmies of the Ancients, and, says Tyson, though it "does so much resemble *a Man* in many of its parts, more than any of the ape kind, or any other *animal* in the world, that I know of: yet by no means do I look upon it as the product of a *mixt* generation—'tis a *Brute Animal sui generis*, and a particular *species of Ape*."

The name of "Chimpanzee," by which one of the African Apes is now so well known, appears to have come into use in the first half of the eighteenth century, but the only important addition made in that period, to our acquaintance with the man-like apes of Africa is contained in "A New Voyage to Guinea," by William Smith, which bears the date 1744.

In describing the animals of Sierra Leone, p. 51, this writer says:—

"I shall next describe a strange sort of animal, called by the white men in this country Mandrill,\* but why it is so called I know not, nor did I ever hear the name before, neither can those who call them so tell, except it be for their near resemblance of a human creature, though nothing at all

\* "Mandrill" seems to signify a "man-like ape," the word "Drill" or "Dril" having been anciently employed in England to denote an Ape or Baboon. Thus in the fifth edition of Blount's "Glossographia, or a Dictionary interpreting the hard words of whatsoever language now used in our refined English tongue . . . very useful for all such as desire to understand what they read," published in 1681, I find, "Dril—a stone-cutter's tool wherewith he bores little holes in marble, &c. Also a large overgrown Ape and Baboon, so called." "Drill" is used in the same sense in Charleton's "Onomasticon Zoicon," 1668. The singular etymology of the word given by Buffon seems hardly a probable one.

like an Ape. Their bodies, when full grown, are as big in circumference as a middle-sized man's—their legs much shorter, and their feet larger; their arms and hands in proportion. The head is monstrously big, and the face broad and flat, without any other hair but the eyebrows; the nose very small, the mouth wide, and the lips thin. The face, which is covered by a white skin, is monstrously ugly, being



FIG. 5.—Facsimile of William Smith's figure of the "Mandrill," 1744.

all over wrinkled as with old age; the teeth broad and yellow; the hands have no more hair than the face, but the same white skin, though all the rest of the body is covered with long black hair, like a bear. They never go upon all-fours, like apes; but cry, when vexed or teased, just like children. . . . .

"When I was at Sherbro, one Mr. Cummerbus, whom I shall have occasion hereafter to mention, made me a present of one of these strange animals, which are called by the natives Boggoe: it was a she-cub, of six months' age, but even then larger than a Baboon. I gave it in charge to one of the slaves, who knew how to feed and nurse it, being a very tender sort of animal; but whenever I went off the deck

the sailors began to tease it—some loved to see its tears and hear it cry; others hated its snotty-nose; one who hurt it, being checked by the negro that took care of it, told the slave he was very fond of his country-woman, and asked him if he should not like her for a wife? To which the slave very readily replied, 'No, this no my wife; this a white woman—this fit wife for you.' This unlucky wit of the negro's, I fancy, hastened its death, for next morning it was found dead under the windlass."

William Smith's 'Mandrill,' or 'Boggoe,' as his description and figure testify, was, without doubt, a Chimpanzee.

Linnæus knew nothing, of his own observation, of the man-like Apes of either Africa or Asia, but a dissertation by his pupil Hoppius in the "Amoenitates Academicæ" (VI. 'Anthropomorpha') may be regarded as embodying his views respecting these animals.

The dissertation is illustrated by a plate, of which the accompanying woodcut, fig. 6, is a reduced copy. The figures are entitled (from left to right) 1. *Troglodyta Bontii*; 2. *Lucifer Aldrovandi*; 3. *Satyrus Tulpia*; 4. *Pygmæus Edwardi*. The first is a bad copy of Bontius' fictitious 'Ourang-outang,' in whose existence, however, Linnæus appears to have fully believed; for in the standard edition of the "Systema

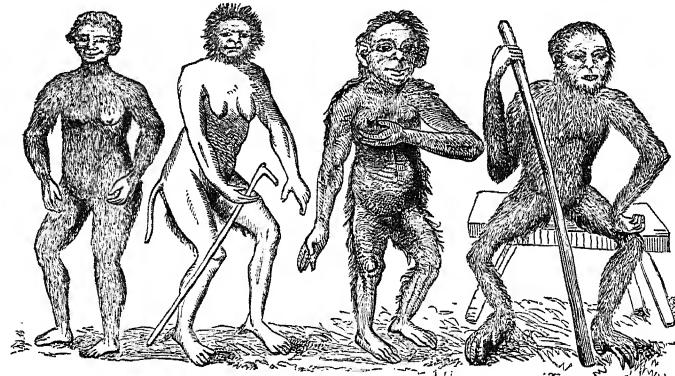


FIG. 6.—The Anthropomorpha of Linnæus.

Naturæ," it is enumerated as a second species of *Homo*; " *H. nocturnus*." *Lucifer Aldrovandi* is a copy of a figure in Aldrovandus, 'De Quadrupedibus digitatis viviparis,' Lib. 2, p. 249. (1645) entitled " *Cercopithecus formæ rarae Barbilius vocatus et originem a china ducebat.*" Hoppius is of opinion that this may be one of that cat-tailed people, of whom Nicolaus Köping affirms that they eat a boat's crew, " *gubernator navis*" and all! In the " *Systema Naturæ*" Linnæus calls it in a note, *Homo caudatus*, and seems inclined to regard it as a third species of man. According to Temminck, *Satyrus Tulpii* is a copy of the figure of a Chimpanzee published by Scotin in 1738, which I have not seen. It is the *Satyrus indicus* of the " *Systema Naturæ*," and is regarded by Linnæus as possibly a distinct species from *Satyrus sylvestris*. The last, named *Pygmæus Edwardi*, is copied from the figure of a young " *Man of the Woods*," or true Orang-Utan, given in Edwards' ' *Gleanings of Natural History*,' (1758).

Buffon was more fortunate than his great rival. Not only had he the rare opportunity of examining a young Chimpanzee in the living state, but he became possessed of an adult Asiatic man-like Ape—the first and the last adult specimen of any of these animals brought to Europe for many years. With the valuable assistance of Daubenton, Buffon gave an excellent description of this creature, which, from its singular proportions, he termed the long-armed Ape, or Gibbon. It is the modern *Hylobates lar*.

Thus when, in 1766, Buffon wrote the fourteenth volume of his great work, he was personally familiar with the young of one kind of African man-like Ape, and with the adult of an Asiatic species—while the Orang-Utan and the Mandrill of Smith were known to him by report. Furthermore, the Abbé Prevost had translated a good deal of Purchas' ' *Pilgrims*' into French, in his ' *Histoire générale des Voyages*' (1748), and there Buffon found a version of Andrew Battell's account of the Pongo and the Engeco. All these data Buffon attempts to weld together into harmony in his chapter en-

titled "Les Orang-outangs ou le Pongo et le Jocko." To this title the following note is appended:—

"Orang-outang nom de cet animal aux Indes orientales : Pongo nom de cet animal à Lowando Province de Congo.

"Jocko, Enjocko, nom de cet animal à Congo que nous avons adopté. *En* est l'article que nous avons retranché."

Thus it was that Andrew Battell's "Engeco" became metamorphosed into "Jocko," and, in the latter shape, was spread all over the world, in consequence of the extensive popularity of Buffon's works. The Abbé Prevost and Buffon between them however, did a good deal more disfigurement to Battell's sober account than 'cutting off an article.' Thus Battell's statement that the Pongos "cannot speake, and have no understanding more than a beast," is rendered by Buffon "qu'il ne peut parler *quoiqu'il ait plus d'entendement que les autres animaux*;" and again, Purchas' affirmation, "He told me in conference with him, that one of these Pongos tooke a negro boy of his which lived a moneth with them," stands in the French version, "un pongo lui enleva un petit negre qui passa un *an* entier dans la société de ces animaux."

After quoting the account of the great Pongo, Buffon justly remarks, that all the 'Jockos' and 'Orangs' hitherto brought to Europe were young; and he suggests that, in their adult condition, they might be as big as the Pongo or 'great Orang,' so that, provisionally, he regarded the Jockos, Orangs, and Pongos as all of one species. And perhaps this was as much as the state of knowledge at the time warranted. But how it came about that Buffon failed to perceive the similarity of Smith's 'Mandrill' to his own 'Jocko,' and confounded the former with so totally different a creature as the blue-faced Baboon, is not so easily intelligible.

Twenty years later Buffon changed his opinion,\* and expressed his belief that the Orangs constituted a genus with two species,—a large one, the Pongo of Battell, and a small one, the Jocko: that the small one (Jocko) is the East Indian Orang;

\* Histoire Naturelle, Suppl. tome 7ème, 1789.

and that the young animals from Africa, observed by himself and Tulpia, are simply young Pongos.

In the meanwhile, the Dutch naturalist, Vosmaer, gave, in 1778, a very good account and figure of a young Orang, brought alive to Holland, and his countryman, the famous anatominist, Peter Camper, published (1779) an essay on the Orang-Utan of similar value to that of Tyson on the Chimpanzee. He dissected several females and a male, all of which, from the state of their skeleton and their dentition, he justly supposes to have been young. However, judging by the analogy of man, he concludes that they could not have exceeded four feet in height in the adult condition. Furthermore, he is very clear as to the specific distinctness of the true East Indian Orang.

“The Orang,” says he, “differs not only from the Pigmy of Tyson and from the Orang of Tulpia by its peculiar colour and its long toes, but also by its whole external form. Its arms, its hands, and its feet are longer, while the thumbs, on the contrary, are much shorter, and the great toes much smaller in proportion.”\* And again, “The true Orang, that is to say, that of Asia, that of Borneo, is consequently not the Pithecius, or tail-less Ape, which the Greeks, and especially Galen, have described. It is neither the Pongo nor the Jocko, nor the Orang of Tulpia, nor the Pigmy of Tyson,—*it is an animal of a peculiar species*, as I shall prove in the clearest manner by the organs of voice and the skeleton in the following chapters,” (l. c. p. 64).

A few years later, M. Radermacher, who held a high office in the Government of the Dutch dominions in India, and was an active member of the Batavian Society of Arts and Sciences, published, in the second part of the Transactions of that Society,† a Description of the Island of Borneo, which was written between the years 1779 and 1781, and, among

\* Camper, *Oeuvres*, I., p. 56.

† *Verhandelingen van het Bataviaasch Genootschap*. Tweede Deel. Derde Druk. 1826.

much other interesting matter, contains some notes upon the Orang. The small sort of Orang-Utan, viz. that of Vosmaer and of Edwards, he says, is found only in Borneo, and chiefly about Banjermassing, Mampauwa, and Landak. Of these he had seen some fifty during his residence in the Indies; but none exceeded  $2\frac{1}{2}$  feet in length. The larger sort, often regarded as a chimæra, continues Radermacher, would, perhaps long have remained so, had it not been for the exertions of the Resident at Rembang, M. Palm, who, on returning from Landak towards Pontiana, shot one, and forwarded it to Batavia in spirit, for transmission to Europe.

Palm's letter describing the capture runs thus:—"Here-with I send your Excellency, contrary to all expectation (since long ago I offered more than a hundred ducats to the natives for an Orang-Utan of four or five feet high) an Orang which I heard of this morning about eight o'clock. For a long time we did our best to take the frightful beast alive in the dense forest about half way to Landak. We forgot even to eat, so anxious were we not to let him escape; but it was necessary to take care he did not revenge himself, as he kept continually breaking off heavy pieces of wood and green branches, and dashing them at us. This game lasted till four o'clock in the afternoon, when we determined to shoot him; in which I succeeded very well, and indeed better than I ever shot from a boat before; for the bullet went just into the side of his chest, so that he was not much damaged. We got him into the prow still living, and bound him fast, and next morning he died of his wounds. All Pontiana came on board to see him when we arrived." Palm gives his height from the head to the heel as 49 inches.

A very intelligent German officer, Baron Von Wurmb, who at this time held a post in the Dutch East India service, and was Secretary of the Batavian Society, studied this animal, and his careful description of it, entitled "Beschrijving van der Groote Borneosche Orang-outang of de Oost-Indische Pongo," is contained in the same volume of the Batavian

Society's Transactions. After Von Wurmb had drawn up his description he states, in a letter dated Batavia, Feb. 18, 1781,\* that the specimen was sent to Europe in brandy to be placed in the collection of the Prince of Orange; "unfortunately," he continues, "we hear that the ship has been wrecked." Von Wurmb died in the course of the year 1781, the letter in which this passage occurs being the last he wrote; but in his posthumous papers, published in the fourth part of the Transactions of the Batavian Society, there is a brief description, with measurements, of a female Pongo four feet high.

Did either of these original specimens, on which Von Wurmb's descriptions are based, ever reach Europe? It is commonly supposed that they did; but I doubt the fact. For, appended to the memoir "De l'Ourang-outang," in the collected edition of Camper's works, Tome I., pp. 64-66, is a note by Camper himself, referring to Von Wurmb's papers, and continuing thus:—"Heretofore, this kind of ape had never been known in Europe. Radermacher has had the kindness

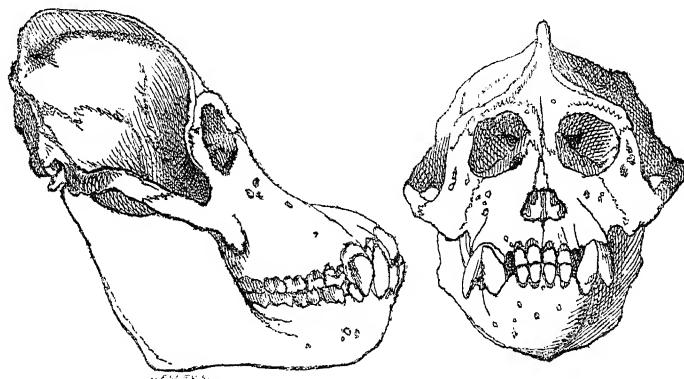


FIG. 7.—The Pongo Skull, sent by Radermacher to Camper, after Camper's original sketches, as reproduced by Lucæ.

to send me the skull of one of these animals, which measured fifty-three inches, or four feet five inches, in height. I have

\* "Briefe des Herrn v. Wurmb und des H. Baron von Wollzogen. Gotha, 1794."

sent some sketches of it to M. Soemmering at Mayence, which are better calculated, however, to give an idea of the form than of the real size of the parts."

These sketches have been reproduced by Fischer and by Lucæ, and bear date 1783, Soemmering having received them in 1784. Had either of Von Wurmb's specimens reached Holland, they would hardly have been unknown at this time to Camper, who, however, goes on to say:—"It appears that since this, some more of these monsters have been captured, for an entire skeleton, very badly set up, which had been sent to the Museum of the Prince of Orange, and which I saw only on the 27th of June, 1784, was more than four feet high. I examined this skeleton again on the 19th December, 1785, after it had been excellently put to rights by the ingenious Onymus."

It appears evident, then, that this skeleton, which is doubtless that which has always gone by the name of Wurmb's Pongo, is not that of the animal described by him, though unquestionably similar in all essential points.

Camper proceeds to note some of the most important features of this skeleton; promises to describe it in detail by-and-bye; and is evidently in doubt as to the relation of this great 'Pongo' to his "petit Orang."

The promised further investigations were never carried out; and so it happened that the Pongo of Von Wurmb took its place by the side of the Chimpanzee, Gibbon, and Orang as a fourth and colossal species of man-like Ape. And indeed nothing could look much less like the Chimpanzees or the Orangs, then known, than the Pongo; for all the specimens of Chimpanzee and Orang which had been observed were small of stature, singularly human in aspect, gentle and docile; while Wurmb's Pongo was a monster almost twice their size, of vast strength and fierceness, and very brutal in expression; its great projecting muzzle, armed with strong teeth, being further disfigured by the outgrowth of the cheeks into fleshy lobes.

Eventually, in accordance with the usual marauding habits of the Revolutionary armies, the 'Pongo' skeleton was carried away from Holland into France, and notices of it, expressly intended to demonstrate its entire distinctness from the Orang and its affinity with the baboons, were given, in 1798, by Geoffroy St. Hilaire and Cuvier.

Even in Cuvier's "Tableau Elementaire," and in the first edition of his great work, the "Regne Animal," the 'Pongo' is classed as a species of Baboon. However, so early as 1818, it appears that Cuvier saw reason to alter this opinion, and to adopt the view suggested several years before by Blumenbach,\* and after him by Tilesius, that the Bornean Pongo is simply an adult Orang. In 1824, Rudolphi demonstrated, by the condition of the dentition, more fully and completely than had been done by his predecessors, that the Orangs described up to that time were all young animals, and that the skull and teeth of the adult would probably be such as those seen in the Pongo of Wurmb. In the second edition of the 'Regne Animal' (1829), Cuvier infers, from the 'proportions of all the parts' and 'the arrangements of the foramina and sutures of the head,' that the Pongo is the adult of the Orang-Utan, 'at least of a very closely allied species,' and this conclusion was eventually placed beyond all doubt by Professor Owen's Memoir published in the 'Zoological Transactions' for 1835, and by Temminck in his 'Monographies de Mammalogie.' Temminck's memoir is remarkable for the completeness of the evidence which it affords as to the modification which the form of the Orang undergoes according to age and sex. Tiedemann first published an account of the brain of the young Orang, while Sandifort, Müller and Schlegel, described the muscles and the viscera of the adult, and gave the earliest detailed and trustworthy history of the habits of the great Indian Ape in a state of

\* See Blumenbach, "Abbildungen Naturhistorischen Gegenstände," No. 12, 1810; and Tilesius, "Naturhistorische Früchte der ersten Kaiserlich-Russischen Erdumsegelung," p. 115, 1813.

nature; and as important additions have been made by later observers, we are at this moment better acquainted with the adult of the Orang-Utan, than with that of any of the other greater man-like Apes.

It is certainly the Pongo of Wurmb;\* and it is as certainly not the Pongo of Battell, seeing that the Orang-Utan is entirely confined to the great Asiatic islands of Borneo and Sumatra.

And while the progress of discovery thus cleared up the history of the Orang, it also became established that the only other man-like Apes in the eastern world were the various species of Gibbon—Apes of smaller stature, and therefore attracting less attention than the Orangs, though they are spread over a much wider range of country, and are hence more accessible to observation.

Although the geographical area inhabited by the 'Pongo' and 'Engeco' of Battell is so much nearer to Europe than that in which the Orang and Gibbon are found, our acquaintance with the African Apes has been of slower growth; indeed, it is only within the last few years that the truthful story of the old English adventurer has been rendered fully intelligible. It was not until 1835 that the skeleton of the adult Chimpanzee became known, by the publication of Professor Owen's above-mentioned very excellent memoir "On the osteology of the Chimpanzee and Orang," in the *Zoological Transactions*—a memoir which, by the accuracy of its descriptions, the carefulness of its comparisons, and the excellence of its figures, made an epoch in the history of our knowledge of the bony framework, not only of the Chimpanzee, but of all the anthropoid Apes.

By the investigations herein detailed, it became evident that the old Chimpanzee acquired a size and aspect as different from those of the young known to Tyson, to Buffon, and to

\* Speaking broadly and without prejudice to the question, whether there be more than one species of Orang.

Traill, as those of the old Orang from the young Orang ; and the subsequent very important researches of Messrs. Savage and Wyman, the American missionary and anatomist, have not only confirmed this conclusion, but have added many new details.\*

One of the most interesting among the many valuable discoveries made by Dr. Thomas Savage is the fact, that the natives in the Gaboon country at the present day, apply to the Chimpanzee a name—"Enché-eko"—which is obviously identical with the "Engeko" of Battell ; a discovery which has been confirmed by all later inquirers. Battell's "lesser monster" being thus proved to be a veritable existence, of course a strong presumption arose that his "greater monster," the 'Pongo,' would sooner or later be discovered. And, indeed, a modern traveller, Bowdich, had, in 1819, found strong evidence, among the natives, of the existence of a second great Ape, called the 'Ingéna,' "five feet high, and four across the shoulders," the builder of a rude house, on the outside of which it slept.

In 1847, Dr. Savage had the good fortune to make another and most important addition to our knowledge of the man-like Apes ; for, being unexpectedly detained at the Gaboon river, he saw in the house of the Rev. Mr. Wilson, a missionary resident there, "a skull represented by the natives to be a monkey-like animal, remarkable for its size, ferocity, and habits." From the contour of the skull, and the information derived from several intelligent natives, "I was induced," says Dr. Savage, (using the term Orang in its old general sense) "to believe that it belonged to a new species of Orang. I expressed this opinion to Mr. Wilson, with a desire for further investigation ; and, if possible, to decide the point by

\* See "Observations on the external characters and habits of the *Troglodytes niger*, by Thomas N. Savage, M.D., and on its organization, by Jeffries Wyman, M.D.," Boston Journal of Natural History, Vol. IV. 1843-4 ; and "External characters, habits, and osteology of *Troglodytes Gorilla*," by the same authors, *ibid.* Vol. V. 1847.

the inspection of a specimen alive or dead." The result of the combined exertions of Messrs. Savage and Wilson was not only the obtaining of a very full account of the habits of this new creature, but a still more important service to science, the enabling the excellent American anatomist already mentioned, Professor Wyman, to describe, from ample materials, the distinctive osteological characters of the new form. This animal was called by the natives of the Gaboon "Engé-ena," a name obviously identical with the "Ingéna" of Bowdich; and Dr. Savage arrived at the conviction that this last discovered of all the great Apes was the long-sought 'Pongo' of Battell.

The justice of this conclusion, indeed, is beyond doubt—for not only does the 'Engé-ena' agree with Battell's "greater monster" in its hollow eyes, its great stature, and its dun or iron-grey colour, but the only other man-like Ape which inhabits these latitudes—the Chimpanzee—is at once identified, by its smaller size, as the "lesser monster," and is excluded from any possibility of being the 'Pongo,' by the fact that it is black and not dun, to say nothing of the important circumstance already mentioned that it still retains the name of 'Engeko,' or 'Enché-eko,' by which Battell knew it.

In seeking for a specific name for the 'Engé-ena,' however, Dr. Savage wisely avoided the much misused 'Pongo'; but finding in the ancient *Periplus of Hanno* the word "Gorilla" applied to certain hairy savage people, discovered by the Carthaginian voyager in an island on the African coast, he attached the specific name "*Gorilla*" to his new ape, whence arises its present well-known appellation. But Dr. Savage, more cautious than some of his successors, by no means identifies his ape with Hanno's 'wild men.' He merely says that the latter were "probably one of the species of the Orang," and I quite agree with M. Brullé, that there is no ground for identifying the modern 'Gorilla' with that of the Carthaginian admiral.

Since the memoir of Savage and Wyman was published,

the skeleton of the Gorilla has been investigated by Professor Owen and by the late Professor Duvernoy, of the Jardin des Plantes, the latter having further supplied a valuable account of the muscular system and of many of the other soft parts ; while African missionaries and travellers have confirmed and expanded the account originally given of the habits of this great man-like Ape, which has had the singular fortune of being the first to be made known to the general world and the last to be scientifically investigated.

Two centuries and a half have passed away since Battell told his stories about the 'greater' and the 'lesser monsters' to Purchas, and it has taken nearly that time to arrive at the clear result that there are four distinct kinds of Anthropoids—in Eastern Asia, the Gibbons and the Orangs ; in Western Africa, the Chimpanzees and the Gorilla.

The man-like Apes, the history of whose discovery has just been detailed, have certain characters of structure and of distribution in common. Thus they all have the same number of teeth as man—possessing four incisors, two canines, four false molars, and six true molars in each jaw, or 32 teeth in all, in the adult condition ; while the milk dentition consists of 20 teeth—or four incisors, two canines, and four molars in each jaw. They are what are called catarrhine Apes—that is, their nostrils have a narrow partition and look downwards ; and, furthermore, their arms are always longer than their legs, the difference being sometimes greater and sometimes less ; so that if the four were arranged in the order of the length of their arms in proportion to that of their legs, we should have this series—Orang ( $1\frac{1}{2}$ —1), Gibbon ( $1\frac{1}{4}$ —1), Gorilla ( $1\frac{1}{3}$ —1), Chimpanzee ( $1\frac{1}{6}$ —1). In all, the fore limbs are terminated by hands, provided with longer or shorter thumbs ; while the great toe of the foot, always smaller than in Man, is far more moveable than in him and can be opposed, like a thumb, to the rest of the foot. None of these apes have tails, and none of them possess the cheek-pouches common

among monkeys. Finally, they are all inhabitants of the old world.

The Gibbons are the smallest, slenderest, and longest-limbed of the man-like apes: their arms are longer in proportion to their bodies than those of any of the other man-like Apes, so that they can touch the ground when erect; their hands are longer than their feet, and they are the only Anthropoids which possess callosities like the lower monkeys. They are variously coloured. The Orangs have arms which reach to the ankles in the erect position of the animal; their thumbs and great toes are very short, and their feet are longer than their hands. They are covered with reddish-brown hair, and the sides of the face, in adult males, are commonly produced into two crescentic, flexible excrescences, like fatty tumours. The Chimpanzees have arms which reach below the knees; they have large thumbs and great toes, their hands are longer than their feet, and their hair is black, while the skin of the face is pale. The Gorilla, lastly, has arms which reach to the middle of the leg, large thumbs and great toes, feet longer than the hands, a black face, and dark-grey or dun hair.

For the purpose which I have at present in view, it is unnecessary that I should enter into any further minutiae respecting the distinctive characters of the genera and species into which these man-like Apes are divided by naturalists. Suffice it to say, that the Orangs and the Gibbons constitute the distinct genera, *Simia* and *Hylobates*; while the Chimpanzees and Gorillas are by some regarded simply as distinct species of one genus, *Troglodytes*; by others as distinct genera—*Troglodytes* being reserved for the Chimpanzees, and *Gorilla* for the Engé-ena or Pongo.

Sound knowledge respecting the habits and mode of life of the man-like Apes has been even more difficult of attainment than correct information regarding their structure.

Once in a generation, a Wallace may be found physically, mentally, and morally qualified to wander unscathed through

the tropical wilds of America and of Asia; to form magnificent collections as he wanders; and withal to think out sagaciously the conclusions suggested by his collections: but, to the ordinary explorer or collector, the dense forests of equatorial Asia and Africa, which constitute the favourite habitation of the Orang, the Chimpanzee, and the Gorilla, present difficulties of no ordinary magnitude: and the man who risks his life by even a short visit to the malarious shores of those regions may well be excused if he shrinks from facing the dangers of the interior; if he contents himself with stimulating the industry of the better seasoned natives, and collecting and collating the more or less mythical reports and traditions with which they are too ready to supply him.

In such a manner most of the earlier accounts of the habits of the man-like Apes originated; and even now a good deal of what passes current must be admitted to have no very safe foundation. The best information we possess is that, based almost wholly on direct European testimony, respecting the Gibbons; the next best evidence relates to the Orangs; while our knowledge of the habits of the Chimpanzee and the Gorilla stands much in need of support and enlargement by additional testimony from instructed European eye-witnesses.

It will therefore be convenient in endeavouring to form a notion of what we are justified in believing about these animals, to commence with the best known man-like Apes, the Gibbons and Orangs; and to make use of the perfectly reliable information respecting them as a sort of criterion of the probable truth or falsehood of assertions respecting the others.

Of the GIBBONS, half a dozen species are found scattered over the Asiatic islands, Java, Sumatra, Borneo, and through Malacca, Siam, Arracan, and an uncertain extent of Hindostan, on the main land of Asia. The largest attain a few inches above three feet in height, from the crown to the heel, so that they are shorter than the other man-like Apes; while the slenderness of their bodies renders their mass far smaller in proportion even to this diminished height.

Dr. Salomon Müller, an accomplished Dutch naturalist, who lived for many years in the Eastern Archipelago, and to



FIG. 8.—A Gibbon (*H. pileatus*), after Wolf.

the results of whose personal experience I shall frequently have occasion to refer, states that the Gibbons are true mountaineers, loving the slopes and edges of the hills,

though they rarely ascend beyond the limit of the fig-trees. All day long they haunt the tops of the tall trees; and though, towards evening, they descend in small troops to the open ground, no sooner do they spy a man than they dart up the hill-sides, and disappear in the darker valleys.

All observers testify to the prodigious volume of voice possessed by these animals. According to the writer whom I have just cited, in one of them, the Siamang, "the voice is grave and penetrating, resembling the sounds *gōek, góek, góek, góek, goek ha ha ha haaāāā*, and may easily be heard at a distance of half a league." While the cry is being uttered, the great membranous bag under the throat which communicates with the organ of voice, the so-called "laryngeal sac," becomes greatly distended, diminishing again when the creature relapses into silence.

M. Duvauzel, likewise, affirms that the cry of the Siamang may be heard for miles—making the woods ring again. So Mr. Martin\* describes the cry of the agile Gibbon as "overpowering and deafening" in a room, and "from its strength, well calculated for resounding through the vast forests." Mr. Waterhouse, an accomplished musician as well as zoologist, says, "The Gibbon's voice is certainly much more powerful than that of any singer I ever heard." And yet it is to be recollected that this animal is not half the height of, and far less bulky in proportion than, a man.

There is good testimony that various species of Gibbon readily take to the erect posture. Mr. George Bennett,† a very excellent observer, in describing the habits of a male *Hylobates syndactylus* which remained for some time in his possession, says; "He invariably walks in the erect posture when on a level surface; and then the arms either hang down, enabling him to assist himself with his knuckles; or what is more usual, he keeps his arms uplifted in nearly an erect position, with the hands pendent ready to seize a rope, and

\* "Man and Monkeys," p. 423.

† *Wanderings in New South Wales*, Vol. II. chap. viii. 1834.

climb up on the approach of danger or on the obtrusion of strangers. He walks rather quick in the erect posture, but with a waddling gait, and is soon run down if, whilst pursued, he has no opportunity of escaping by climbing. . . . When he walks in the erect posture he turns the leg and foot outwards, which occasions him to have a waddling gait and to seem bow-legged."

Dr. Burrough states of another Gibbon, the Horlack or Hooluk :

"They walk erect; and when placed on the floor, or in an open field, balance themselves very prettily, by raising their hands over their head and slightly bending the arm at the wrist and elbow, and then run tolerably fast, rocking from side to side; and, if urged to greater speed, they let fall their hands to the ground, and assist themselves forward, rather jumping than running, still keeping the body, however, nearly erect."

Somewhat different evidence, however, is given by Dr. Winslow Lewis :\*

"Their only manner of walking was on their posterior or inferior extremities, the others being raised upwards to preserve their equilibrium, as rope-dancers are assisted by long poles at fairs. Their progression was not by placing one foot before the other, but by simultaneously using both, as in jumping." Dr. Salomon Müller also states that the Gibbons progress upon the ground by short series of tottering jumps, effected only by the hind limbs, the body being held altogether upright.

But, Mr. Martin, (l. c. p. 418) who also speaks from direct observation, says of the Gibbons generally :

"Pre-eminently qualified for arboreal habits, and displaying among the branches amazing activity, the Gibbons are not so awkward or embarrassed on a level surface as might be imagined. They walk erect, with a waddling or unsteady gait, but at a quick pace; the equilibrium of the body

\* Boston Journal of Natural History, Vol. I. 1834.

requiring to be kept up, either by touching the ground with the knuckles, first on one side then on the other, or by uplifting the arms so as to poise it. As with the Chimpanzee, the whole of the narrow, long sole of the foot is placed upon the ground at once and raised at once, without any elasticity of step."

After this mass of concurrent and independent testimony, it cannot reasonably be doubted that the Gibbons commonly and habitually assume the erect attitude.

But level ground is not the place where these animals can display their very remarkable and peculiar locomotive powers, and that prodigious activity which almost tempts one to rank them among flying, rather than among ordinary climbing mammals.

Mr. Martin (l. c. p. 430) has given so excellent and graphic an account of the movements of a *Hylobates agilis*, living in the Zoological Gardens, in 1840, that I will quote it in full :

"It is almost impossible to convey in words an idea of the quickness and graceful address of her movements: they may indeed be termed aerial, as she seems merely to touch in her progress the branches among which she exhibits her evolutions. In these feats her hands and arms are the sole organs of locomotion; her body hanging as if suspended by a rope, sustained by one hand (the right, for example), she launches herself, by an energetic movement, to a distant branch, which she catches with the left hand; but her hold is less than momentary: the impulse for the next launch is acquired: the branch then aimed at is attained by the right hand again, and quitted instantaneously, and so on, in alternate succession. In this manner spaces of twelve and eighteen feet are cleared, with the greatest ease and uninterrupted, for hours together, without the slightest appearance of fatigue being manifested; and it is evident that, if more space could be allowed, distances very greatly exceeding eighteen feet would be as easily cleared; so that Duvauzel's assertion that he has seen these animals launch

themselves from one branch to another, forty feet asunder, startling as it is, may be well credited. Sometimes, on seizing a branch in her progress, she will throw herself, by the power of one arm only, completely round it, making a revolution with such rapidity as almost to deceive the eye, and continue her progress with undiminished velocity. It is singular to observe how suddenly this Gibbon can stop, when the impetus given by the rapidity and distance of her swinging leaps would seem to require a gradual abatement of her movements. In the very midst of her flight a branch is seized, the body raised, and she is seen, as if by magic, quietly seated on it, grasping it with her feet. As suddenly she again throws herself into action.

“The following facts will convey some notion of her dexterity and quickness. A live bird was let loose in her apartment; she marked its flight, made a long swing to a distant branch, caught the bird with one hand in her passage, and attained the branch with her other hand; her aim, both at the bird and at the branch, being as successful as if one object only had engaged her attention. It may be added that she instantly bit off the head of the bird, picked its feathers, and then threw it down without attempting to eat it.

“On another occasion this animal swung herself from a perch, across a passage at least twelve feet wide, against a window which it was thought would be immediately broken: but not so; to the surprise of all, she caught the narrow framework between the panes with her hand, in an instant attained the proper impetus, and sprang back again to the cage she had left—a feat requiring not only great strength, but the nicest precision.”

The Gibbons appear to be naturally very gentle, but there is very good evidence that they will bite severely when irritated—a female *Hylobates agilis* having so severely lacerated one man with her long canines, that he died; while she had

injured others so much that, by way of precaution, these formidable teeth had been filed down; but, if threatened, she would still turn on her keeper. The Gibbons eat insects, but appear generally to avoid animal food. A Siamang, however, was seen by Mr. Bennett to seize and devour greedily a live lizard. They commonly drink by dipping their fingers in the liquid and then licking them. It is asserted that they sleep in a sitting posture.

Duvaucel affirms that he has seen the females carry their young to the waterside and there wash their faces, in spite of resistance and cries. They are gentle and affectionate in captivity—full of tricks and pettishness, like spoiled children, and yet not devoid of a certain conscience, as an anecdote, told by Mr. Bennett (l. c. p. 156), will show. It would appear that his Gibbon had a peculiar inclination for disarranging things in the cabin. Among these articles, a piece of soap would especially attract his notice, and for the removal of this he had been once or twice scolded. “One morning,” says Mr. Bennett, “I was writing, the ape being present in the cabin, when casting my eyes towards him, I saw the little fellow taking the soap. I watched him without his perceiving that I did so: and he occasionally would cast a furtive glance towards the place where I sat. I pretended to write; he, seeing me busily occupied, took the soap, and moved away with it in his paw. When he had walked half the length of the cabin, I spoke quietly, without frightening him. The instant he found I saw him, he walked back again, and deposited the soap nearly in the same place from whence he had taken it. There was certainly something more than instinct in that action: he evidently betrayed a consciousness of having done wrong both by his first and last actions—and what is reason if that is not an exercise of it?”

The most elaborate account of the natural history of the ORANG-UTAN extant, is that given in the “Verhandelingen

over de Natuurlijke Geschiedenis der Nederlandsche overzeesche Bezittingen (1839-45)," by Dr. Salomon Müller and Dr. Schlegel, and I shall base what I have to say upon this



FIG. 9.—An adult male Orang-Utan, after Müller and Schlegel.

subject almost entirely on their statements, adding, here and there, particulars of interest from the writings of Brooke, Wallace, and others.

The Orang-Utan would rarely seem to exceed four feet in height, but the body is very bulky, measuring two-thirds of the height in circumference.\*

The Orang-Utan is found only in Sumatra and Borneo, and is common in neither of these islands—in both of which it occurs always in low, flat plains, never in the mountains. It loves the densest and most sombre of the forests, which extend from the sea-shore inland, and thus is found only in the eastern half of Sumatra, where alone such forests occur, though, occasionally, it strays over to the western side.

On the other hand, it is generally distributed through Borneo, except in the mountains, or where the population is dense. In favourable places, the hunter may, by good fortune, see three or four in a day.

Except in the pairing time, the old males usually live by themselves. The old females, and the immature males, on the other hand, are often met with in twos and threes; and the former occasionally have young with them, though the pregnant females usually separate themselves, and sometimes remain apart after they have given birth to their offspring. The young Orangs seem to remain unusually long under their mother's protection, probably in consequence of their slow growth. While climbing, the mother always carries her young

\* The largest Orang-Utan, cited by Temminck, measured, when standing upright, four feet; but he mentions having just received news of the capture of an Orang five feet three inches high. Schlegel and Müller say that their largest old male measured, upright, 1.25 Netherlands "el;" and from the crown to the end of the toes, 1.5 el; the circumference of the body being about 1 el. The largest old female was 1.09 el high, when standing. The adult skeleton in the College of Surgeons' Museum, if set upright, would stand 3 ft. 6-8 in. from crown to sole. Dr. Humphry gives 3 ft. 8 in. as the mean height of two Orangs. Of seventeen Orangs examined by Mr. Wallace, the largest was 4 ft. 2 in. high, from the heel to the crown of the head. Mr. Spencer St. John, however, in his "Life in the Forests of the Far East," tells us of an Orang of "5 ft. 2 in., measuring fairly from the head to the heel," 15 in. across the face, and 12 in. round the wrist. It does not appear, however, that Mr. St. John measured this Orang himself.

against her bosom, the young holding on by his mother's hair.\* At what time of life the Orang-Utan becomes capable of propagation, and how long the females go with young, is unknown, but it is probable that they are not adult until they arrive at ten or fifteen years of age. A female which lived for five years at Batavia, had not attained one-third the height of the wild females. It is probable that, after reaching adult years, they go on growing, though slowly, and that they live to forty or fifty years. The Dyaks tell of old Orangs, which have not only lost all their teeth, but which find it so troublesome to climb, that they maintain themselves on windfalls and juicy herbage.

The Orang is sluggish, exhibiting none of that marvellous activity characteristic of the Gibbons. Hunger alone seems to stir him to exertion, and when it is stilled, he relapses into repose. When the animal sits, it curves its back and bows its head, so as to look straight down on the ground; sometimes it holds on with its hands by a higher branch, sometimes lets them hang phlegmatically down by its side—and in these positions the Orang will remain, for hours together, in the sun.

It, almost without stirring, and only now and then giving utterance to its deep, growling voice. By day it usually climbs from one tree-top to another, and only at night descends to the ground, and if then threatened with danger, he seeks refuge among the undergrowth. When not hunted he remains a long time in the same locality, and sometimes stops for many days on the same tree—a firm place among its branches serving him for a bed. It is rare for the Orang to pass the night in the summit of a large tree, probably because it is too windy and cold there for him; but, as soon as night draws on, he descends from the height and seeks out a fit bed.

Mr. Wallace's account of an infant "Orang-utan," in the "Annals of Natural History" for 1856. Mr. Wallace provided his interesting charge with an artificial mother of buffalo-skin, but the cheat was too successful. The infant's entire experience led it to associate teats with hair, and feeling the latter, it spent its existence in vain endeavours to discover the former.

in the lower and darker part, or in the leafy top of a small tree, among which he prefers Nibong Palms, Pandani, or one of those parasitic Orchids which give the primæval forests of Borneo so characteristic and striking an appearance. But wherever he determines to sleep, there he prepares himself a sort of nest: little boughs and leaves are drawn together round the selected spot, and bent crosswise over one another; while to make the bed soft, great leaves of Ferns, of Orchids, of *Pandanus fascicularis*, *Nipa fruticans*, &c., are laid over them. Those which Müller saw, many of them being very fresh, were situated at a height of ten to twenty-five feet above the ground, and had a circumference, on the average, of two or three feet. Some were packed many inches thick with *Pandanus* leaves; others were remarkable only for the cracked twigs, which, united in a common centre, formed a regular platform. "The rude *hut*," says Sir James Brooke, "which they are stated to build in the trees, would be more properly called a seat or nest, for it has no roof or cover of any sort. The facility with which they form this nest is curious, and I had an opportunity of seeing a wounded female weave the branches together and seat herself, within a minute."

According to the Dyaks the Orang rarely leaves his bed before the sun is well above the horizon and has dissipated the mists. He gets up about nine, and goes to bed again about five; but sometimes not till late in the twilight. He lies sometimes on his back; or, by way of change, turns on one side or the other, drawing his limbs up to his body, and resting his head on his hand. When the night is cold, windy, or rainy, he usually covers his body with a heap of *Pandanus*, *Nipa*, or Fern leaves, like those of which his bed is made, and he is especially careful to wrap up his head in them. It is this habit of covering himself up which has probably led to the fable that the Orang builds huts in the trees.

Although the Orang resides mostly amid the boughs of great

another.—And, though these differences and resemblances cannot be weighed and measured, their value may be readily estimated ; the scale or standard of judgment, touching that value, being afforded and expressed by the system of classification of animals now current among zoologists.

A careful study of the resemblances and differences presented by animals has, in fact, led naturalists to arrange them into groups, or assemblages, all the members of each group presenting a certain amount of definable resemblance, and the number of points of similarity being smaller as the group is larger and *vice versa*. Thus, all creatures which agree only in presenting the few distinctive marks of animality form the 'Kingdom' ANIMALIA. The numerous animals which agree only in possessing the special characters of Vertebrates form one 'Sub-kingdom' of this Kingdom. Then the Sub-kingdom VERTEBRATA is subdivided into the five 'Classes,' Fishes, Amphibians, Reptiles, Birds, and Mammals, and these into smaller groups called 'Orders;' these into 'Families' and 'Genera;' while the last are finally broken up into the smallest assemblages, which are distinguished by the possession of constant, not-sexual, characters. These ultimate groups are Species.

Every year tends to bring about a greater uniformity of opinion throughout the zoological world as to the limits and characters of these groups, great and small. At present, for example, no one has the least doubt regarding the characters of the classes Mammalia, Aves, or Reptilia ; nor does the question arise whether any thoroughly well-known animal should be placed in one class or the other. Again, there is a very general agreement respecting the characters and limits of the orders of Mammals, and as to the animals which are structurally necessitated to take a place in one or another order.

No one doubts, for example, that the Sloth and the Ant-eater, the Kangaroo and the Opossum, the Tiger and the Badger, the Tapir and the Rhinoceros, are respectively mem-

bers of the same orders. These successive pairs of animals may, and some do, differ from one another immensely, in such matters as the proportions and structure of their limbs; the number of their dorsal and lumbar vertebræ; the adaptation of their frames to climbing, leaping, or running; the number and form of their teeth; and the characters of their skulls and of the contained brain. But, with all these differences, they are so closely connected in all the more important and fundamental characters of their organization, and so distinctly separated by these same characters from other animals, that zoologists find it necessary to group them together as members of one order. And if any new animal were discovered, and were found to present no greater difference from the Kangaroo or from the Opossum, for example, than these animals do from one another, the zoologist would not only be logically compelled to rank it in the same order with these, but he would not think of doing otherwise.

Bearing this obvious course of zoological reasoning in mind, let us endeavour for a moment to disconnect our thinking selves from the mask of humanity; let us imagine ourselves scientific Saturnians, if you will, fairly acquainted with such animals as now inhabit the Earth, and employed in discussing the relations they bear to a new and singular 'erect and featherless biped,' which some enterprising traveller, overcoming the difficulties of space and gravitation, has brought from that distant planet for our inspection, well preserved, may be, in a cask of rum. We should all, at once, agree upon placing him among the mammalian vertebrates; and his lower jaw, his molars, and his brain, would leave no room for doubting the systematic position of the new genus among those mammals, whose young are nourished during gestation by means of a placenta, or what are called the 'placental mammals.'

Further, the most superficial study would at once convince us that, among the orders of placental mammals, neither the Whales, nor the hoofed creatures, nor the Sloths and Ant-

eaters, nor the carnivorous Cats, Dogs, and Bears, still less the Rodent Rats and Rabbits, or the Insectivorous Moles and Hedgehogs, or the Bats, could claim our '*Homo*' as one of themselves.

There would remain then, but one order for comparison, that of the Apes (using that word in its broadest sense), and the question for discussion would narrow itself to this—is Man so different from any of these Apes that he must form an order by himself? Or does he differ less from them than they differ from one another, and hence must take his place in the same order with them?

Being happily free from all real, or imaginary, personal interest in the results of the inquiry thus set afoot, we should proceed to weigh the arguments on one side and on the other, with as much judicial calmness as if the question related to a new Opossum. We should endeavour to ascertain, without seeking either to magnify or diminish them, all the characters by which our new Mammal differed from the Apes; and if we found that these were of less structural value, than those which distinguish certain members of the Ape order from others universally admitted to be of the same order, we should undoubtedly place the newly discovered tellurian genus with them.

I now proceed to detail the facts which seem to me to leave us no choice but to adopt the last mentioned course.

It is quite certain that the Ape which most nearly approaches man, in the totality of its organization, is either the Chimpanzee or the Gorilla; and as it makes no practical difference, for the purposes of my present argument, which is selected for comparison, on the one hand, with Man, and on the other hand, with the rest of the Primates,\* I shall select the latter (so far as its organization is known)—

\* We are not at present thoroughly acquainted with the brain of the Gorilla, and therefore, in discussing cerebral characters, I shall take that of the Chimpanzee as my highest term among the Apes.

as a brute now so celebrated in prose and verse, that all must have heard of him, and have formed some conception of his appearance. I shall take up as many of the most important points of difference between man and this remarkable creature, as the space at my disposal will allow me to discuss, and the necessities of the argument demand; and I shall inquire into the value and magnitude of these differences, when placed side by side with those which separate the Gorilla from other animals of the same order.

In the general proportions of the body and limbs there is a remarkable difference between the Gorilla and Man, which at once strikes the eye. The Gorilla's brain-case is smaller, its trunk larger, its lower limbs shorter, its upper limbs longer in proportion than those of Man.

I find that the vertebral column of a full grown Gorilla, in the Museum of the Royal College of Surgeons, measures 27 inches along its anterior curvature, from the upper edge of the atlas, or first vertebra of the neck, to the lower extremity of the sacrum; that the arm, without the hand, is  $31\frac{1}{2}$  inches long; that the leg, without the foot, is  $26\frac{1}{2}$  inches long; that the hand is  $9\frac{3}{4}$  inches long; the foot  $11\frac{1}{4}$  inches long.

In other words, taking the length of the spinal column as 100, the arm equals 115, the leg 96, the hand 36, and the foot 41.

In the skeleton of a male Bosjesman, in the same collection, the proportions, by the same measurement, to the spinal column, taken as 100, are—the arm 78, the leg 110, the hand 26, and the foot 32. In a woman of the same race the arm is 83, and the leg 120, the hand and foot remaining the same. In a European skeleton I find the arm to be 80, the leg 117, the hand 26, the foot 35.

Thus the leg is not so different as it looks at first sight, in its proportion to the spine in the Gorilla and in the Man—being very slightly shorter than the spine in the former, and between  $\frac{1}{6}$  and  $\frac{1}{5}$  longer than the spine in the latter. Th

foot is longer and the hand much longer in the Gorilla; but the great difference is caused by the arms, which are very much longer than the spine in the Gorilla, very much shorter than the spine in the Man.

The question now arises how are the other Apes related to the Gorilla in these respects—taking the length of the spine, measured in the same way, at 100. In an adult Chimpanzee, the arm is only 96, the leg 90, the hand 43, the foot 39—so that the hand and the leg depart more from the human proportion and the arm less, while the foot is about the same as in the Gorilla.

In the Orang, the arms are very much longer than in the Gorilla (122), while the legs are shorter (88); the foot is longer than the hand (52 and 48), and both are much longer in proportion to the spine.

In the other man-like Apes again, the Gibbons, these proportions are still further altered; the length of the arms being to that of the spinal column as 19 to 11; while the legs are also a third longer than the spinal column, so as to be longer than in Man, instead of shorter. The hand is half as long as the spinal column, and the foot, shorter than the hand, is about  $\frac{5}{11}$ ths of the length of the spinal column.

Thus *Hylobates* is as much longer in the arms than the Gorilla, as the Gorilla is longer in the arms than Man; while, on the other hand, it is as much longer in the legs than the Man, as the Man is longer in the legs than the Gorilla, so that it contains within itself the extremest deviations from the average length of both pairs of limbs (see the Frontispiece).

The Mandrill presents a middle condition, the arms and legs being nearly equal in length, and both being shorter than the spinal column; while hand and foot have nearly the same proportions to one another and to the spine, as in Man.

In the Spider monkey (*Ateles*) the leg is longer than the spine, and the arm than the leg; and, finally, in that remarkable Lemurine form, the Indri, (*Lichanotus*) the leg is about as long as the spinal column, while the arm is not

more than  $\frac{1}{8}$  of its length ; the hand having rather less and the foot rather more, than one third the length of the spinal column.

These examples might be greatly multiplied, but they suffice to show that, in whatever proportion of its limbs the Gorilla differs from Man, the other Apes depart still more widely from the Gorilla and that, consequently, such differences of proportion can have no ordinal value.

We may next consider the differences presented by the trunk, consisting of the vertebral column, or backbone, and the ribs and pelvis, or bony hip-basin, which are connected with it, in Man and in the Gorilla respectively.

In Man, in consequence partly of the disposition of the articular surfaces of the vertebrae, and largely of the elastic tension of some of the fibrous bands, or ligaments, which connect these vertebrae together, the spinal column, as a whole, has an elegant S-like curvature, being convex forwards in the neck, concave in the back, convex in the loins, or lumbar region, and concave again in the sacral region ; an arrangement which gives much elasticity to the whole backbone, and diminishes the jar communicated to the spine, and through it to the head, by locomotion in the erect position.

Furthermore, under ordinary circumstances, Man has seven vertebrae in his neck, which are called *cervical*; twelve succeed these, bearing ribs and forming the upper part of the back, whence they are termed *dorsal*; five lie in the loins, bearing no distinct, or free, ribs, and are called *lumbar*; five, united together into a great bone, excavated in front, solidly wedged in between the hip bones, to form the back of the pelvis, and known by the name of the *sacrum*, succeed these; and finally, three or four little more or less moveable bones, so small as to be insignificant, constitute the *coccyx* or rudimentary tail.

In the Gorilla, the vertebral column is similarly divided into cervical, dorsal, lumbar, sacral and coccygeal vertebrae, and the total number of cervical and dorsal vertebrae, taken to-

gether, is the same as in man; but the development of a pair of ribs to the first lumbar vertebra, which is an exceptional occurrence in Man, is the rule in the Gorilla; and hence, as lumbar are distinguished from dorsal vertebræ only by the presence or absence of free ribs, the seventeen "dorsolumbar" vertebræ of the Gorilla are divided into thirteen dorsal and four lumbar, while in Man they are twelve dorsal and five lumbar.

Not only, however, does Man occasionally possess thirteen pair of ribs,\* but the Gorilla sometimes has fourteen pairs, while an Orang-Utan skeleton in the Museum of the Royal College of Surgeons has twelve dorsal and five lumbar vertebræ, as in Man. Cuvier notes the same number in a *Hylobates*. On the other hand, among the lower Apes, many possess twelve dorsal and six or seven lumbar vertebræ; the Douroucouli has fourteen dorsal and eight lumbar, and a Lemur (*Stenops tardigradus*) has fifteen dorsal and nine lumbar vertebræ.

The vertebral column of the Gorilla, as a whole, differs from that of Man in the less marked character of its curves, especially in the slighter convexity of the lumbar region. Nevertheless, the curves are present, and are quite obvious in young skeletons of the Gorilla and Chimpanzee which have been prepared without removal of the ligaments. In young Orangs similarly preserved, on the other hand, the spinal column is either straight, or even concave forwards, throughout the lumbar region.

Whether we take these characters then, or such minor ones as those which are derivable from the proportional length of the spines of the cervical vertebræ, and the like, there is

\* "More than once," says Peter Camper, "have I met with more than six lumbar vertebræ in man. . . . Once I found thirteen ribs and four lumbar vertebræ." Fallopius noted thirteen pair of ribs and only four lumbar vertebræ; and Eustachius once found eleven dorsal vertebræ and six lumbar vertebræ.—"Œuvres de Pierre Camper," T. 1, p. 42. As Tyson states, his "Pygmie" had thirteen pair of ribs and five lumbar vertebræ. The question of the curves of the spinal column in the Apes requires further investigation.

no doubt whatsoever as to the marked difference between Man and the Gorilla; but there is as little, that equally marked differences, of the very same order, obtain between the Gorilla and the lower apes.

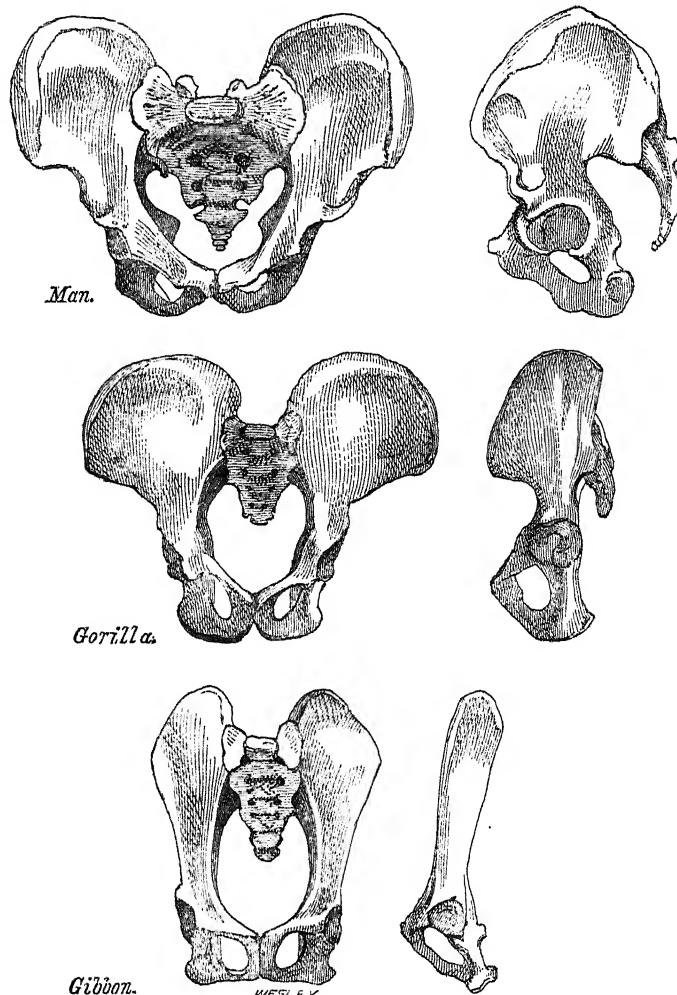


FIG. 16.—Front and side views of the bony pelvis of Man, the Gorilla and Gibbon: reduced from drawings made from nature, of the same absolute length, by Mr. Waterhouse Hawkins.

The Pelvis, or bony girdle of the hips, of Man is a strikingly human part of his organization; the expanded haunch bones affording support for his viscera during his habitually erect posture, and giving space for the attachment of the great muscles which enable him to assume and to preserve that attitude. In these respects the pelvis of the Gorilla differs very considerably from his (Fig. 16). But go no lower than the Gibbon, and see how vastly more he differs from the Gorilla than the latter does from Man, even in this structure. Look at the flat, narrow haunch bones—the long and narrow passage—the coarse, outwardly curved, ischiatic prominences on which the Gibbon habitually rests, and which are coated by the so-called “callosities,” dense patches of skin, wholly absent in the Gorilla, in the Chimpanzee, and in the Orang, as in Man!

In the lower Monkeys and in the Lemurs the difference becomes more striking still, the pelvis acquiring an altogether quadrupedal character.

But now let us turn to a nobler and more characteristic organ—that by which the human frame seems to be, and indeed is, so strongly distinguished from all others,—I mean the skull. The differences between a Gorilla's skull and a Man's are truly immense (Fig. 17). In the former, the face, formed largely by the massive jaw-bones, predominates over the brain case, or cranium proper: in the latter, the proportions of the two are reversed. In the Man, the occipital foramen, through which passes the great nervous cord connecting the brain with the nerves of the body, is placed just behind the centre of the base of the skull, which thus becomes evenly balanced in the erect posture; in the Gorilla, it lies in the posterior third of that base. In the Man, the surface of the skull is comparatively smooth, and the supra-ciliary ridges or brow prominences usually project but little—while, in the Gorilla, vast crests are developed upon the skull, and the brow ridges overhang the cavernous orbits, like great penthouses.

Sections of the skulls, however, show that some of the apparent defects of the Gorilla's cranium arise, in fact, not so much from deficiency of brain case as from excessive development of the parts of the face. The cranial cavity is not ill-shaped, and the forehead is not truly flattened or very retreating, its really well-formed curve being simply disguised by the mass of bone which is built up against it (Fig. 17).

But the roofs of the orbits rise more obliquely into the cranial cavity, thus diminishing the space for the lower part of the anterior lobes of the brain, and the absolute capacity of the cranium is far less than that of Man. So far as I am aware, no human cranium belonging to an adult man has yet been observed with a less cubical capacity than 62 cubic inches, the smallest cranium observed in any race of men by Morton, measuring 63 cubic inches; while, on the other hand, the most capacious Gorilla skull yet measured has a content of not more than  $34\frac{1}{2}$  cubic inches. Let us assume, for simplicity's sake, that the lowest Man's skull has twice the capacity of that of the highest Gorilla.\*

\* It has been affirmed that Hindoo crania sometimes contain as little as 27 ounces of water, which would give a capacity of about 46 cubic inches. The minimum capacity which I have assumed above, however, is based upon the valuable tables published by Professor R. Wagner in his "Vorstudien zu einer wissenschaftlichen Morphologie und Physiologie des menschlichen Gehirns." As the result of the careful weighing of more than 900 human brains, Professor Wagner states that one-half weighed between 1200 and 1400 grammes, and that about two-ninths, consisting for the most part of male brains, exceed 1400 grammes. The lightest brain of an adult male, with sound mental faculties, recorded by Wagner, weighed 1020 grammes. As a gramme equals 15.4 grains, and a cubic inch of water contains 252.4 grains, this is equivalent to 62 cubic inches of water; so that as brain is heavier than water, we are perfectly safe against erring on the side of diminution in taking this as the smallest capacity of any adult male human brain. The only adult male brain, weighing as little as 970 grammes, is that of an idiot; but the brain of an adult woman, against the soundness of whose faculties nothing appears, weighed as little as 907 grammes (55.3 cubic inches of water); and Reid gives an adult female brain of still smaller capacity. The heaviest brain (1872 grammes, or about 115 cubic inches) was, however, that of a woman; next to it comes the brain of Cuvier (1861 grammes), then Byron (1807 grammes), and then an insane

No doubt, this is a very striking difference, but it loses much of its apparent systematic value, when viewed by the light of certain other equally indubitable facts respecting cranial capacities.

The first of these is, that the difference in the volume of the cranial cavity of different races of mankind is far greater, absolutely, than that between the lowest Man and the highest Ape, while, relatively, it is about the same. For the largest human skull measured by Morton, contained 114 cubic inches, that is to say, had very nearly double the capacity of the smallest; while its absolute preponderance, of 52 cubic inches—is far greater than that by which the lowest adult male human cranium surpasses the largest of the Gorillas ( $62 - 34\frac{1}{2} = 27\frac{1}{2}$ ). Secondly, the adult crania of Gorillas which have as yet been measured differ among themselves by nearly one-third, the maximum capacity being 34.5 cubic inches, the minimum 24 cubic inches; and, thirdly, after making all due allowance for difference of size, the cranial capacities of some of the lower apes fall nearly as much, relatively, below those of the higher Apes as the latter fall below Man.

Thus, even in the important matter of cranial capacity, Men differ more widely from one another than they do from the Apes; while the lowest Apes differ as much, in proportion, from the highest, as the latter does from Man. The last proposition is still better illustrated by the study of the modifications which other parts of the cranium undergo in the Simian series.

It is the large proportional size of the facial bones and the great projection of the jaws which confers upon the Gorilla's skull its small facial angle and brutal character.

person (1783 grammes). The lightest adult brain recorded (720 grammes) was that of an idiotic female. The brains of five children, four years old, weighed between 1275 and 992 grammes. So that it may be safely said, that an average European child of four years old has a brain twice as large as that of an adult Gorilla.

But if we consider the proportional size of the facial bones to the skull proper only, the little *Chrysotrix* (Fig. 17) differs

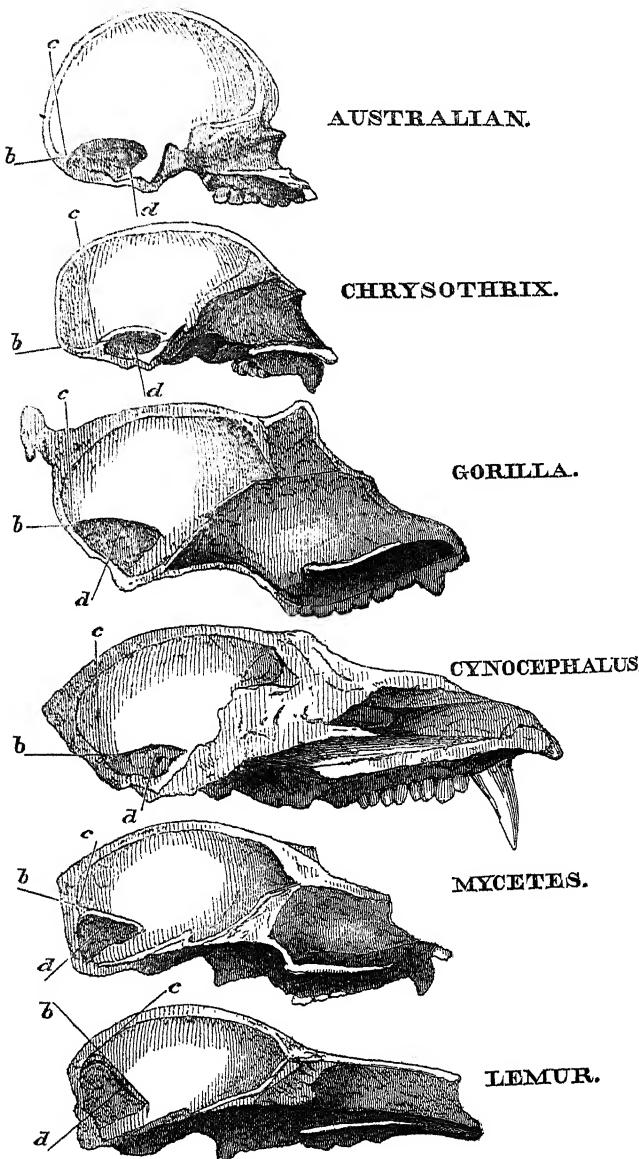


FIG. 17.—Sections of the skulls of Man and various Apes, drawn so as to give the cerebral cavity the same length in each case, thereby displaying the varying

very widely from the Gorilla and, in the same way, as Man does; while the Baboons (*Cynocephalus*, Fig. 17) exaggerate the gross proportions of the muzzle of the great Anthropoid, so that its visage looks mild and human by comparison with theirs. The difference between the Gorilla and the Baboon is even greater than it appears at first sight; for the great facial mass of the former is largely due to a downward development of the jaws; an essentially human character, super-added upon that almost purely forward, essentially brutal, development of the same parts which characterizes the Baboon, and yet more remarkably distinguishes the Lemur.

Similarly, the occipital foramen of *Mycetes* (Fig. 17), and still more of the Lemurs, is situated completely in the posterior face of the skull, or as much further back than that of the Gorilla, as that of the Gorilla is further back than that of Man; while, as if to render patent the futility of the attempt to base any broad classificatory distinction on such a character, the same group of Platyrrhine, or American monkeys, to which the *Mycetes* belongs, contains the *Chrysorthrix*, whose occipital foramen is situated far more forward than in any other ape, and nearly approaches the position it holds in Man.

Again, the Orang's skull is as devoid of excessively developed supraciliary prominences as a Man's, though some varieties exhibit great crests elsewhere (see p. 41); and in some of the Cebine apes and in the *Chrysorthrix*, the cranium is as smooth and rounded as that of Man himself.

What is true of these leading characteristics of the skull, holds good, as may be imagined, of all minor features; so that for every constant difference between the Gorilla's skull

proportions of the facial bones. The line *b* indicates the plane of the tentorium, which separates the cerebrum from the cerebellum; *d*, the axis of the occipital outlet of the skull. The extent of cerebral cavity behind *e*, which is a perpendicular erected on *b* at the point where the tentorium is attached posteriorly, indicates the degree to which the cerebrum overlaps the cerebellum—the space occupied by which is roughly indicated by the dark shading. In comparing these diagrams, it must be recollected, that figures on so small a scale as these simply exemplify the statements in the text, the proof of which is to be found in the objects themselves.

and the Man's, a similar constant difference of the same order (that is to say, consisting in excess or defect of the same quality) may be found between the Gorilla's skull and that of some other ape. So that, for the skull, no less than for the skeleton in general, the proposition holds good, that the differences between Man and the Gorilla are of smaller value than those between the Gorilla and some other Apes.

In connection with the skull, I may speak of the teeth—organs which have a peculiar classificatory value, and whose resemblances and differences of number, form, and succession, taken as a whole, are usually regarded as more trustworthy indicators of affinity than any others.

Man is provided with two sets of teeth—milk teeth and permanent teeth. The former consist of four incisors, or cutting teeth; two canines, or eye-teeth; and four molars, or grinders, in each jaw, making twenty in all. The latter (Fig. 18) comprise four incisors, two canines, four small grinders, called premolars or false molars, and six large grinders, or true molars in each jaw—making thirty-two in all. The internal incisors are larger than the external pair, in the upper jaw, smaller than the external pair, in the lower jaw. The crowns of the upper molars exhibit four cusps, or blunt-pointed elevations, and a ridge crosses the crown obliquely, from the inner, anterior, cusp to the outer, posterior cusp (Fig. 18 *m<sup>2</sup>*). The anterior lower molars have five cusps, three external and two internal. The premolars have two cusps, one internal and one external, of which the outer is the higher.

In all these respects the dentition of the Gorilla may be described in the same terms as that of Man; but in other matters it exhibits many and important differences (Fig. 18).

Thus the teeth of man constitute a regular and even series—without any break and without any marked projection of one tooth above the level of the rest; a peculiarity which, as Cuvier long ago showed, is shared by no other

mammal save one—as different a creature from man as can well be imagined—namely, the long extinct *Anoplotherium*. The teeth of the Gorilla, on the contrary, exhibit a break, or interval, termed the *diastema*, in both jaws: in front of the eye-tooth, or between it and the outer incisor, in the upper

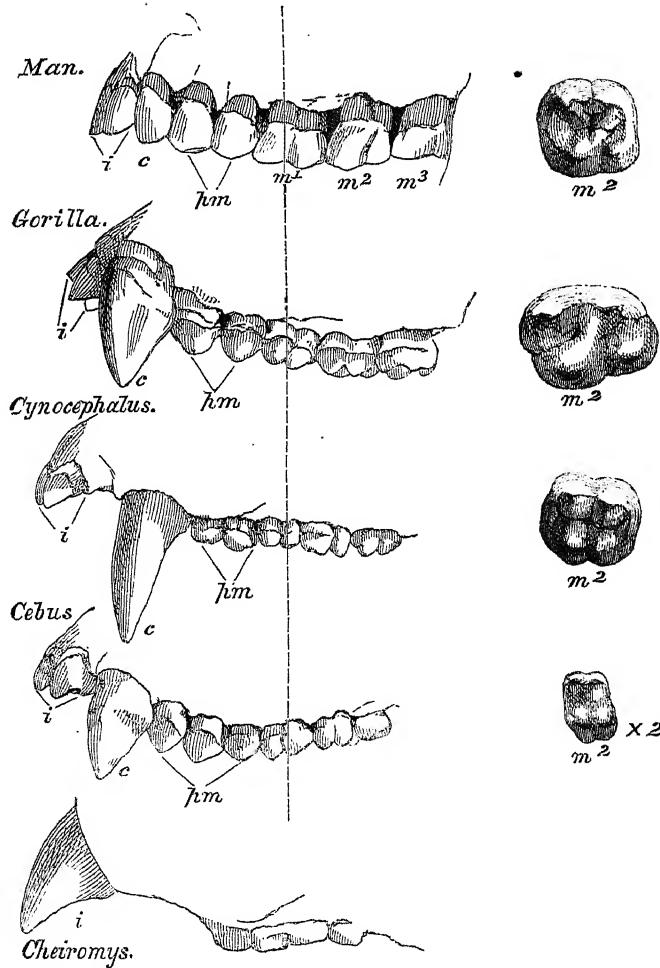


FIG. 18.—Lateral views, of the same length, of the upper jaws of various Primates. *i*, incisors; *c*, canines; *pm*, premolars; *m*, molars. A line is drawn through the first molar of *Man*, *Gorilla*, *Cynocephalus*, and *Cebus*, and the grinding surface of the second molar is shown in each, its anterior and internal angle being just above the *m* of *m<sup>2</sup>*.

jaw; behind the eye-tooth, or between it and the front false molar, in the lower jaw. Into this break in the series, in each jaw, fits the canine of the opposite jaw; the size of the eye-tooth in the Gorilla being so great that it projects, like a tusk, far beyond the general level of the other teeth. The roots of the false molar teeth of the Gorilla, again, are more complex than in Man, and the proportional size of the molars is different. The Gorilla has the crown of the hindmost grinder of the lower jaw more complex, and the order of eruption of the permanent teeth is different; the permanent canines making their appearance before the second and third molars in Man, and after them in the Gorilla.

Thus, while the teeth of the Gorilla closely resemble those of Man in number, kind, and in the general pattern of their crowns, they exhibit marked differences from those of Man in secondary respects, such as relative size, number of fangs, and order of appearance.

But, if the teeth of the Gorilla be compared with those of an Ape, no further removed from it than a *Cynocephalus*, or Baboon, it will be found that differences and resemblances of the same order are easily observable; but that many of the points in which the Gorilla resembles Man are those in which it differs from the Baboon; while various respects in which it differs from Man are exaggerated in the *Cynocephalus*. The number and the nature of the teeth remain the same in the Baboon as in the Gorilla and in Man. But the pattern of the Baboon's upper molars is quite different from that described above (Fig. 18), the canines are proportionally longer and more knife-like; the anterior premolar in the lower jaw is specially modified; the posterior molar of the lower jaw is still larger and more complex than in the Gorilla.

Passing from the old-world Apes to those of the new world, we meet with a change of much greater importance than any of these. In such a genus as *Cebus*, for example (Fig. 18), it will be found that while in some secondary points, such as the projection of the canines and the diastema, the resemblance

to the great ape is preserved ; in other and most important respects, the dentition is extremely different. Instead of 20 teeth in the milk set, there are 24 : instead of 32 teeth in the permanent set, there are 36, the false molars being increased from eight to twelve. And in form, the crowns of the molars are very unlike those of the Gorilla, and differ far more widely from the human pattern.

The Marmosets, on the other hand, exhibit the same number of teeth as Man and the Gorilla ; but, notwithstanding this, their dentition is very different, for they have four more false molars, like the other American monkeys—but as they have four fewer true molars, the total remains the same. And passing from the American apes to the Lemurs, the dentition becomes still more completely and essentially different from that of the Gorilla. The incisors begin to vary both in number and in form. The molars acquire, more and more, a many-pointed, insectivorous character, and in one Genus, the Aye-Aye (*Cheiromys*), the canines disappear, and the teeth completely simulate those of a Rodent (Fig. 18).

Hence it is obvious that, greatly as the dentition of the highest Ape differs from that of Man, it differs far more widely from that of the lower and lowest Apes.

Whatever part of the animal fabric—whatever series of muscles, whatever viscera might be selected for comparison—the result would be the same—the lower Apes and the Gorilla would differ more than the Gorilla and the Man. I cannot attempt in this place to follow out all these comparisons in detail, and indeed it is unnecessary I should do so. But certain real, or supposed, structural distinctions between man and the apes remain, upon which so much stress has been laid, that they require careful consideration, in order that the true value may be assigned to those which are real, and the emptiness of those which are fictitious may be exposed. I refer to the characters of the hand, the foot, and the brain.

Man has been defined as the only animal possessed of two

hands terminating his fore limbs, and of two feet ending his hind limbs, while it has been said that all the apes possess four hands; and he has been affirmed to differ fundamentally from all the apes in the characters of his brain, which alone, it has been strangely asserted and re-asserted, exhibits the structures known to anatomists as the posterior lobe, the posterior cornu of the lateral ventricle, and the hippocampus minor.

That the former proposition should have gained general acceptance is not surprising—indeed, at first sight, appearances are much in its favour: but, as for the second, one can only admire the surpassing courage of its enunciator, seeing that it is an innovation which is not only opposed to generally and justly accepted doctrines, but which is directly negatived by the testimony of all original inquirers, who have specially investigated the matter: and that it neither has been, nor can be, supported by a single anatomical preparation. It would, in fact, be unworthy of serious refutation, except for the general and natural belief that deliberate and reiterated assertions must have some foundation.

Before we can discuss the first point with advantage we must consider with some attention, and compare together, the structure of the human hand and that of the human foot, so that we may have distinct and clear ideas of what constitutes a hand and what a foot.

The external form of the human hand is familiar enough to every one. It consists of a stout wrist followed by a broad palm, formed of flesh, and tendons, and skin, binding together four bones, and dividing into four long and flexible digits, or fingers, each of which bears on the back of its last joint a broad and flattened nail. The longest cleft between any two digits is rather less than half as long as the hand. From the outer side of the base of the palm a stout digit goes off, having only two joints instead of three; so short, that it only reaches to a little beyond the middle of the first joint of the finger next

it; and further remarkable by its great mobility, in consequence of which it can be directed outwards, almost at a right angle to the rest. This digit is called the '*pollex*,' or thumb; and, like the others, it bears a flat nail upon the back of its terminal joint. In consequence of the proportions and mobility of the thumb, it is what is termed "opposable;" in other words, its extremity can, with the greatest ease, be brought into contact with the extremities of any of the fingers; a property upon which the possibility of our carrying into effect the conceptions of the mind so largely depends.

The external form of the foot differs widely from that of the hand; and yet, when closely compared, the two present some singular resemblances. Thus the ankle corresponds in a manner with the wrist; the sole with the palm; the toes with the fingers; the great toe with the thumb. But the toes, or digits of the foot, are far shorter in proportion than the digits of the hand, and are less moveable, the want of mobility being most striking in the great toe—which, again, is very much larger in proportion to the other toes than the thumb to the fingers. In considering this point, however, it must not be forgotten that the civilized great toe, confined and cramped from childhood upwards, is seen to a great disadvantage, and that in uncivilized and barefooted people it retains a great amount of mobility, and even some sort of opposability. The Chinese boatmen are said to be able to pull an oar; the artisans of Bengal to weave, and the Carajas to steal fishhooks by its help; though, after all, it must be recollected that the structure of its joints and the arrangement of its bones, necessarily render its prehensile action far less perfect than that of the thumb.

But to gain a precise conception of the resemblances and differences of the hand and foot, and of the distinctive characters of each, we must look below the skin, and compare the bony framework and its motor apparatus in each (Fig. 19).

The skeleton of the hand exhibits, in the region which we term the wrist, and which is technically called the *carpus*—

two rows of closely fitted polygonal bones, four in each row, which are tolerably equal in size. The bones of the first row with the bones of the forearm, form the wrist joint, and are arranged side by side, no one greatly exceeding or overlapping the rest.

Three of the bones of the second row of the carpus bear the four long bones which support the palm of the hand. The

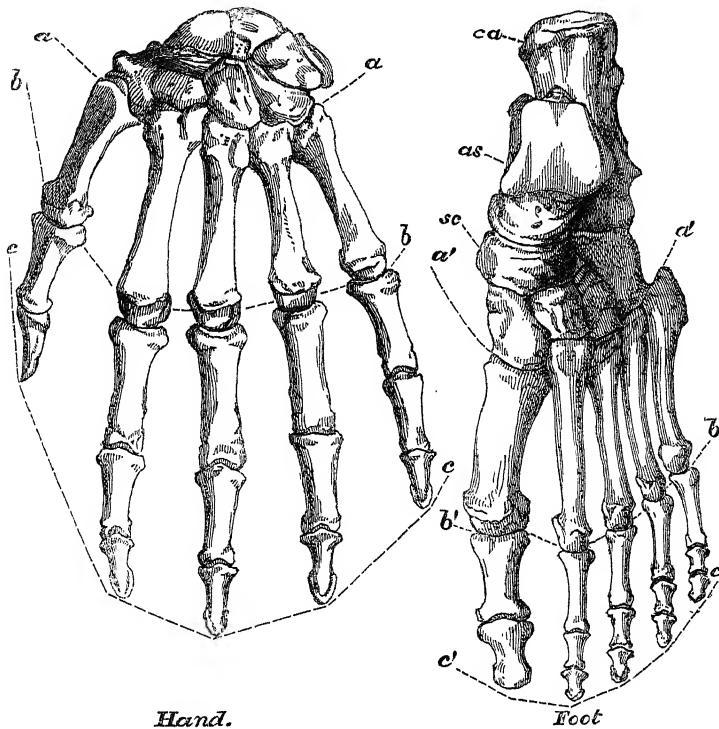


FIG. 19.—The skeleton of the Hand and Foot of Man reduced from Dr. Carter's drawings in Gray's 'Anatomy.' The hand is drawn to a larger scale than the foot. The line  $a\ a$  in the hand indicates the boundary between the carpus and the metacarpus;  $b\ b$  that between the latter and the proximal phalanges;  $c\ c$  marks the ends of the distal phalanges. The line  $a'\ a'$  in the foot indicates the boundary between the tarsus and metatarsus;  $b'\ b'$  marks that between the metatarsus and the proximal phalanges; and  $c'\ c'$  bounds the ends of the distal phalanges:  $ca$ , the calcaneum;  $as$ , the astragalus;  $sc$ , the scaphoid bone in the tarsus.